

**Transfer-resistant cosmetic composition comprising a  
block polymer**

The present invention relates to a cosmetic  
5 composition comprising a particular block polymer,  
which is intended to be applied to human keratin  
materials, for instance the skin, the lips, the  
eyelashes, the eyebrows, the nails and the hair. The  
composition is more particularly intended to be applied  
10 to the skin or the lips.

The composition according to the invention  
may be a makeup composition or a care composition for  
keratin materials, in particular for the skin and the  
lips, and preferably a makeup composition.

15 The makeup composition may be a lip makeup  
product (lipstick), a foundation, an eyeshadow, a  
makeup rouge, a concealer product, an eyeliner, a body  
makeup product, a mascara, a nail varnish or a hair  
makeup product.

20 The care composition may be a body and facial  
skin care product, especially an antisen product or a  
skin-colouring product (such as a self-tanning  
product). The composition may also be a haircare  
product, especially for holding the hairstyle or  
25 shaping the hair.

Lipstick and foundation compositions are  
commonly used to give the lips or the skin, and

especially the face, an aesthetic colour. These makeup products generally contain fatty phases such as waxes and oils, pigments and/or fillers and optionally additives, for instance cosmetic or dermatological  
5 active agents.

When they are applied to the skin, these compositions have the drawback of transferring, i.e. of becoming at least partially deposited, and leaving marks, on certain supports with which they may come  
10 into contact and especially a glass, a cup, a cigarette, an item of clothing or the skin. This results in mediocre persistence of the applied film, making it necessary to regularly renew the application of the foundation or lipstick composition. Moreover,  
15 the appearance of these unacceptable marks, especially on blouse collars, may put certain women off using this type of makeup.

"Transfer-resistant" lip and skin makeup compositions are thus sought, which have the advantage  
20 of forming a deposit that does not become at least partially deposited onto the supports with which they come into contact (glass, clothing, cigarette or fabric).

To limit the transfer of cosmetic  
25 compositions, it is known practice to use volatile oils, especially in contents of greater than 40% by weight. These volatile oils present in large amount

render the makeup product, especially lipstick, uncomfortable for the user: the makeup deposit gives a sensation of drying-out and of tautness.

Products in the form of two separate  
5 compositions to be applied one over the other onto the lips to obtain a transfer-resistant makeup result are also known. For example, the product Lip Finité from Max Factor is a two-coated product, the base composition (known as the base coat) of which contains  
10 a silicone resin and volatile oils, and the surface composition (known as the top coat) of which contains a sucrose ester (as described in patent application WO 97/17057) to improve the comfort of the transfer-resistant makeup product. However, the need to apply  
15 two compositions to make up the face may be unacceptable for certain users.

The aim of the present invention is to provide a novel route for the formulation of a cosmetic composition, especially a makeup composition, which  
20 makes it possible to obtain a deposit that has good transfer-resistance properties, especially without using a large content of volatile oils, the said deposit possibly being obtained with this composition alone.

25 The aim of the invention is also to provide a cosmetic composition, especially a makeup composition, which makes it possible to obtain a comfortable deposit

on the skin or the lips.

The inventors have discovered that it is possible to obtain such a composition by using a particular block polymer as described hereinbelow. The  
5 composition makes it possible to obtain a deposit, especially a makeup result on keratin materials, in particular on the skin or the lips, which has good transfer-resistance properties. Furthermore, the deposit obtained on the skin or the lips does not cause  
10 the user any sensation of drying-out or of tautness: the deposit is thus comfortable.

One subject of the present invention is thus, more specifically, a cosmetic composition comprising at least one cosmetically acceptable organic liquid medium  
15 and at least one film-forming linear block ethylenic polymer as described hereinbelow, the composition especially being as defined hereinbelow.

Advantageously, according to a first embodiment of the composition according to the  
20 invention, the film-forming linear block ethylenic polymer is free of styrene and is such that, when it is present in sufficient amount in the composition, the said composition is capable of forming a deposit that has a transfer of less than or equal to 35%.

25 Advantageously, according to a second embodiment of the composition according to the invention, the film-forming linear block ethylenic

polymer is non-elastomeric and is such that when it is present in sufficient amount in the composition, the said composition is capable of forming a deposit that has a transfer of less than or equal to 35%.

5           Advantageously, the composition according to the invention is capable of forming a deposit that has a transfer of less than or equal to 35%, preferably less than or equal to 30%, preferably less than or equal to 25%, preferably less than or equal to 20%,  
10 preferably less than or equal to 15%, preferably less than or equal to 10% and preferably less than or equal to 5%.

A subject of the invention is also a non-therapeutic cosmetic process for making up or caring  
15 for keratin materials, in particular the skin or the lips, comprising the application to the keratin materials, in particular to the skin or the lips, of a composition as defined above.

A subject of the invention is also the use of  
20 a composition as defined above, to obtain a transfer-resistant deposit, especially a transfer-resistant makeup result, on keratin materials, in particular on the skin or the lips.

A subject of the invention is also the use of  
25 a block polymer as defined above, in a cosmetic composition comprising a cosmetically acceptable organic liquid medium, to obtain a transfer-resistant

deposit, especially a transfer-resistant makeup result, on keratin materials, in particular on the skin or the lips.

The transfer of the deposit obtained with the composition according to the invention is determined according to the protocol described hereinbelow.

A support (rectangle of 40 mm × 70 mm and 3 mm thick) of polyethylene foam that is adhesive on one of the faces, having a density of 33 kg/m<sup>3</sup> (sold under the name RE40X70EP3 from the company Joint Technique Lyonnais Ind) is preheated on a hotplate maintained at a temperature of 40°C in order for the surface of the support to be maintained at a temperature of 33°C ± 1°C.

The composition is applied over the entire non-adhesive surface of the support, by spreading it using a fine brush to obtain a deposit of about 15 µm of the composition, while leaving the support on the hotplate, and the support is then left to dry for 30 minutes.

After drying, the support is bonded via its adhesive face onto an anvil of diameter 20 mm and equipped with a screw pitch. The support/deposit assembly is then cut up using a punch 18 mm in diameter. The anvil is then screwed onto a press (Statif Manuel Imada SV-2 from the company Someco) equipped with a tensile testing machine (Imada DPS-20

from the company Someco).

White photocopier paper of 80 g/m<sup>2</sup> is placed on the bed of the press and the support/deposit assembly is then pressed on the paper at a pressure of 2.5 kg for 30 seconds. After removing the support/deposit assembly, some of the deposit is transferred onto the paper. The colour of the deposit transferred onto the paper is then measured using a Minolta CR300 colorimeter, the colour being characterized by the L\*, a\*, b\* colorimetric parameters. The colorimetric parameters L\*<sub>0</sub>, a\*<sub>0</sub> and b\*<sub>0</sub> of the colour of the plain paper used is determined.

The difference in colour ΔE1 between the colour of the deposit transferred relative to the colour of the plain paper is then determined by means of the following relationship.

$$\Delta E1 = \sqrt{(L^* - L_0^*)^2 + (a^* - a_0^*)^2 + (b^* - b_0^*)^2}$$

Moreover, a total transfer reference is prepared by applying the composition directly onto a paper identical to the one used previously, at room temperature (25°C), by spreading the composition using a fine brush and so as to obtain a deposit of about 15 μm of the composition, and the deposit is then left to dry for 30 minutes at room temperature (25°C). After drying, the colorimetric parameters L\*', a\*' and b\*' of

the colour of the deposit placed on the paper,  
corresponding to the reference colour of total  
transfer, is measured directly. The colorimetric  
parameters  $L^*_0$ ,  $a^*_0$  and  $b^*_0$  of the colour of the  
5 plain paper used are determined.

The difference in colour  $\Delta E_2$  between the  
reference colour of total transfer relative to the  
colour of the plain paper are then determined by means  
of the following relationship.

10

$$\Delta E_2 = \sqrt{(L^*_1 - L^*_0)^2 + (a^*_1 - a^*_0)^2 + (b^*_1 - b^*_0)^2}$$

The transfer of the composition, expressed as  
a percentage, is equal to the ratio:

15

$$100 \times \Delta E_1 / \Delta E_2$$

The measurement is performed on 4 supports in  
succession and the transfer value corresponds to the  
mean of the 4 measurements obtained with the 4  
20 supports.

The term "organic liquid" means any non-  
aqueous product that is liquid at room temperature  
(25°C).

The term "cosmetically acceptable organic  
25 liquid medium" means a medium comprising at least one  
organic compound that is liquid at room temperature  
(25°C) and atmospheric pressure ( $10^5$  Pa), which is



compatible with keratin materials, especially the skin or the lips, such as the organic solvents and oils commonly used in cosmetic compositions.

The composition according to the invention  
5 may comprise a styrene-free film-forming linear block ethylenic block polymer.

The term "styrene-free polymer" means a polymer comprising less than 10%, preferably less than 5%, preferably less than 2% and more preferably less  
10 than 1%, or even containing no, styrene monomer such as styrene or styrene derivatives, for instance methylstyrene, chlorostyrene or chloromethylstyrene.

According to one embodiment, the block polymer of the composition according to the invention  
15 is derived from aliphatic ethylenic monomers. The term "aliphatic monomer" means a monomer comprising no aromatic groups.

The term "ethylenic polymer" means a polymer obtained by polymerization of monomers comprising an  
20 ethylenic unsaturation.

The term "block polymer" means a polymer comprising at least two different blocks and preferably at least three different blocks.

The polymer is a polymer of linear structure.  
25 In contrast, a polymer of non-linear structure is, for example, a polymer of branched structure, of starburst or grafted form, or the like.

The term "film-forming polymer" means a polymer capable of forming, by itself or in the presence of a film-forming auxiliary agent, a continuous film that adheres to a support, especially  
5 to keratin materials.

Preferentially, the polymer used in the composition according to the invention comprises no silicon atoms in its skeleton. The term "skeleton" means the main chain of the polymer, as opposed to the  
10 pendent side chains.

Advantageously, the said block polymer comprises at least one first block and at least one second block that have different glass transition temperatures ( $T_g$ ), the said first and second blocks  
15 being linked together via an intermediate block comprising at least one constituent monomer of the first block and at least one constituent monomer of the second block.

The term "at least one block" means one or  
20 more blocks.

It is pointed out that, in the text hereinabove and hereinbelow, the terms "first block" and "second block" do not in any way condition the order of the said blocks in the structure of the  
25 polymer.

Preferably, the first and second blocks of the said block polymer are mutually incompatible.

The term "mutually incompatible blocks" means that the blend formed from the polymer corresponding to the first block and from the polymer corresponding to the second block is not miscible in the organic liquid that is the majority amount by weight of the organic liquid medium of the composition, at room temperature (25°C) and atmospheric pressure ( $10^5$  Pa), for a polymer blend content of greater than or equal to 5% by weight, relative to the total weight of the blend (polymers and solvent), it being understood that:

- i) the said polymers are present in the blend in a content such that the respective weight ratio ranges from 10/90 to 90/10, and that
- ii) each of the polymers corresponding to the first and second blocks has an average (weight-average or number-average) molecular mass equal to that of the block polymer  $\pm 15\%$ .

In the case where the organic liquid medium comprises a mixture of organic liquids, and should two or more organic liquids be present in identical mass proportions, the said polymer blend is immiscible in at least one of them.

Needless to say, in the case where the organic liquid medium comprises only one organic liquid, this liquid is the majority organic liquid.

Advantageously, the majority organic liquid of the composition is the organic solvent for

polymerization of the block polymer or the majority organic solvent of the mixture of organic solvents for polymerization of the block polymer.

Preferably, the block polymer used in the composition according to the invention is not water-soluble, i.e. the polymer is not soluble in water or in a mixture of water and of linear or branched lower monoalcohols containing from 2 to 5 carbon atoms, for instance ethanol, isopropanol or n-propanol, without pH modification, at an active material content of at least 1% by weight, at room temperature (25°C).

Preferably, the block polymer used in the composition according to the invention is not an elastomer.

The term "non-elastomeric polymer" means a polymer which, when it is subjected to a constraint intended to pull it (for example by 30% relative to its initial length), does not return to a length substantially identical to its initial length when the constraint ceases.

More specifically, the term "non-elastomeric polymer" denotes a polymer with an instantaneous recovery  $R_i < 50\%$  and a delayed recovery  $R_{2h} < 70\%$  after having been subjected to a 30% elongation. Preferably,  $R_i$  is  $< 30\%$  and  $R_{2h} < 50\%$ .

More specifically, the non-elastomeric nature of the polymer is determined according to the following

protocol:

A polymer film is prepared by pouring a solution of the polymer in a Teflon-coated mould, followed by drying for 7 days in an environment  
5 conditioned at  $23 \pm 5^{\circ}\text{C}$  and  $50 \pm 10\%$  relative humidity.

A film about  $100\text{ }\mu\text{m}$  thick is thus obtained, from which are cut rectangular specimens (for example using a punch)  $15\text{ mm}$  wide and  $80\text{ mm}$  long.

This sample is subjected to a tensile stress  
10 using a machine sold under the reference Zwick, under the same temperature and humidity conditions as for the drying.

The specimens are pulled at a speed of  $50\text{ mm/min}$  and the distance between the jaws is  $50\text{ mm}$ ,  
15 which corresponds to the initial length ( $l_0$ ) of the specimen.

The instantaneous recovery  $R_i$  is determined in the following manner:

- the specimen is pulled by  $30\%$  ( $\epsilon_{\text{max}}$ ), i.e. about  $0.3$   
20 times its initial length ( $l_0$ )
- the constraint is released by applying a return speed equal to the tensile speed, i.e.  $50\text{ mm/min}$ , and the residual elongation of the specimen is measured as a percentage, after returning to zero constraint ( $\epsilon_i$ ).

25 The percentage instantaneous recovery ( $R_i$ ) is given by the following formula:

$$R_i = (\epsilon_{\max} - \epsilon_i) / \epsilon_{\max} \times 100$$

To determine the delayed recovery, the percentage residual elongation of the specimen ( $\epsilon_{2h}$ ) is  
5 measured.

The percentage delayed recovery ( $R_{2h}$ ) is given by the following formula:

$$R_{2h} = (\epsilon_{\max} - \epsilon_{2h}) / \epsilon_{\max} \times 100$$

10

Purely as a guide, a polymer according to one embodiment of the invention has an instantaneous recovery  $R_i$  of 10% and a delayed recovery  $R_{2h}$  of 30%.

Advantageously, the block polymer used in the  
15 composition according to the invention has a polydispersity index  $I$  of greater than 2.

The intermediate block is a block comprising at least one constituent monomer of the first block and at least one constituent monomer of the second block of  
20 the polymer, which makes it possible to "compatibilize" these blocks.

The polydispersity index  $I$  of the polymer is equal to the ratio of the weight-average mass  $M_w$  to the number-average mass  $M_n$ .

25 The weight-average molar mass ( $M_w$ ) and number-average molar mass ( $M_n$ ) are determined by gel permeation liquid chromatography (THF solvent,

calibration curve established with linear polystyrene standards, refractometric detector).

The weight-average mass ( $M_w$ ) of the block polymer used in the composition according to the invention is preferably less than or equal to 300 000; it ranges, for example, from 35 000 to 200 000 and better still from 45 000 to 150 000.

The number-average mass ( $M_n$ ) of the block polymer used in the composition according to the invention is preferably less than or equal to 70 000; it ranges, for example, from 10 000 to 60 000 and better still from 12 000 to 50 000.

The polydispersity index of the block polymer used in the composition according to the invention is advantageously greater than 2, for example greater than 2 and less than or equal to 9, preferably greater than or equal to 2.5, for example ranging from 2.5 to 8, and better still greater than or equal to 2.8, especially from 2.8 to 6.

Each block of the polymer used in the composition according to the invention is derived from one type of monomer or from several different types of monomer.

This means that each block may consist of a homopolymer or a copolymer; this copolymer constituting the block may in turn be random or alternating.

Advantageously, the intermediate block

comprising at least one constituent monomer of the first block and at least one constituent monomer of the second block of the polymer is a random polymer.

Preferably, the intermediate block is derived essentially from constituent monomers of the first block and of the second block.

The term "essentially" means at least 85%, preferably at least 90%, better still 95% and even better still 100%.

Advantageously, the intermediate block has a glass transition temperature  $T_g$  that is between the glass transition temperatures of the first and second blocks.

The glass transition temperatures indicated for the first and second blocks may be theoretical  $T_g$  values determined from the theoretical  $T_g$  values of the constituent monomers of each of the blocks, which may be found in a reference manual such as the Polymer Handbook, 3rd Edition, 1989, John Wiley, according to the following relationship, known as Fox's law:

$$1/T_g = \sum_i (\omega_i / T_{g_i}),$$

$\omega_i$  being the mass fraction of the monomer  $i$  in the block under consideration and  $T_{g_i}$  being the glass transition temperature of the homopolymer of the monomer  $i$ .

Unless otherwise indicated, the  $T_g$  values



indicated for the first and second blocks in the present patent application are theoretical Tg values.

Advantageously, the first and second blocks of the polymer are such that the difference between the  
5 glass transition temperatures of the first and second blocks is generally greater than 10°C, preferably greater than 20°C and better still greater than 30°C.

In particular, the first block may be chosen from:

- 10 a) a block with a Tg of greater than or equal to 40°C,  
b) a block with a Tg of less than or equal to 20°C,  
c) a block with a Tg of between 20 and 40°C,  
and the second block can be chosen from a category a),  
b) or c) different from the first block.

15 In the present invention, the expression:  
"between ... and ..." is intended to denote a range of values for which the limits mentioned are excluded, and  
"from ... to ..." and "ranging from ... to ..." are  
intended to denote a range of values for which the  
20 limits are included.

a) Block with a Tg of greater than or equal to 40°C

The block with a Tg of greater than or equal to 40°C has, for example, a Tg ranging from 40 to 150°C, preferably greater than or equal to 50°C, for  
25 example ranging from 50°C to 120°C and better still greater than or equal to 60°C, for example ranging from 60°C to 120°C.

The block with a Tg of greater than or equal to 40°C may be a homopolymer or a copolymer.

In the case where this block is a homopolymer, it is derived from a monomer whose  
5 homopolymer has a glass transition temperature of greater than or equal to 40°C.

In the case where the first block is a copolymer, it may be totally or partially derived from one or more monomers, the nature and concentration of  
10 which are chosen such that the Tg of the resulting copolymer is greater than or equal to 40°C. The copolymer may comprise, for example:

- monomers whose homopolymer has a Tg of greater than or equal to 40°C, for example a Tg ranging from 40 to  
15 150°C, preferably greater than or equal to 50°C, for example ranging from 50°C to 120°C and better still greater than or equal to 60°C, for example ranging from 60°C to 120°C, and
- monomers whose homopolymer has a Tg of less than  
20 40°C, chosen from monomers whose homopolymer has a Tg of between 20 and 40°C and/or monomers whose homopolymer has a Tg of less than or equal to 20°C, for example a Tg ranging from -100 to 20°C, preferably less than 15°C, especially ranging from -80°C to 15°C and  
25 better still less than 10°C, for example ranging from -50°C to 0°C, as described later.

The monomers whose homopolymer has a glass

transition temperature of greater than or equal to 40°C are chosen, preferably, from the following monomers, also known as the main monomers:

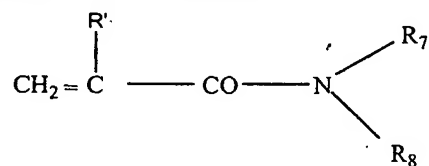
- methacrylates of formula  $\text{CH}_2 = \text{C}(\text{CH}_3)\text{-COOR}_1$

- 5 in which  $\text{R}_1$  represents a linear or branched unsubstituted alkyl group containing from 1 to 4 carbon atoms, such as a methyl, ethyl, propyl or isobutyl group or  $\text{R}_1$  represents a  $\text{C}_4$  to  $\text{C}_{12}$  cycloalkyl group,

- acrylates of formula  $\text{CH}_2 = \text{CH-COOR}_2$

- 10 in which  $\text{R}_2$  represents a  $\text{C}_4$  to  $\text{C}_{12}$  cycloalkyl group such as an isobornyl group or a tert-butyl group,

- (meth)acrylamides of formula:



in which  $\text{R}_7$  and  $\text{R}_8$ , which may be identical or different,

- 15 each represent a hydrogen atom or a linear or branched  $\text{C}_1$  to  $\text{C}_{12}$  alkyl group such as an n-butyl, t-butyl, isopropyl, isohexyl, isooctyl or isononyl group; or  $\text{R}_7$  represents H and  $\text{R}_8$  represents a 1,1-dimethyl-3-oxobutyl group,

- 20 and  $\text{R}'$  denotes H or methyl. Examples of monomers that may be mentioned include N-butylacrylamide, N-t-butylacrylamide, N-isopropylacrylamide, N,N-dimethylacrylamide and N,N-dibutylacrylamide, - and mixtures thereof.

- 25 Main monomers that are particularly preferred

are methyl methacrylate, isobutyl (meth)acrylate and isobornyl (meth)acrylate, and mixtures thereof.

b) Block with a Tg of less than or equal to 20°C

5 The block with a Tg of less than or equal to 20°C has, for example, a Tg ranging from -100 to 20°C, preferably less than or equal to 15°C, especially ranging from -80°C to 15°C and better still less than or equal to 10°C, for example ranging from -50°C to 0°C.

10 The block with a Tg of less than or equal to 20°C may be a homopolymer or a copolymer.

In the case where this block is a homopolymer, it is derived from monomers which are such that the homopolymers prepared from these monomers have  
15 glass transition temperatures of less than or equal to 20°C. This second block may be a homopolymer consisting of only one type of monomer (for which the Tg of the corresponding homopolymer is less than or equal to 20°C).

20 In the case where the block with a Tg of less than or equal to 20°C is a copolymer, it may be totally or partially derived from one or more monomers, the nature and concentration of which are chosen such that the Tg of the resulting copolymer is less than or equal  
25 to 20°C.

It may comprise, for example

- one or more monomers whose corresponding homopolymer

has a Tg of less than or equal to 20°C, for example a Tg ranging from -100°C to 20°C, preferably less than 15°C, especially ranging from -80°C to 15°C and better still less than 10°C, for example ranging from -50°C to 5 0°C, and

- one or more monomers whose corresponding homopolymer has a Tg of greater than 20°C, such as monomers with a Tg of greater than or equal to 40°C, for example a Tg ranging from 40 to 150°C, preferably greater than or 10 equal to 50°C, for example ranging from 50°C to 120°C and better still greater than or equal to 60°C, for example ranging from 60°C to 120°C and/or monomers with a Tg of between 20 and 40°C, as described above.

Preferably, the block with a Tg of less than 15 or equal to 20°C is a homopolymer.

The monomers whose homopolymer has a Tg of less than or equal to 20°C are preferably chosen from the following monomers, or main monomer:

- acrylates of formula  $\text{CH}_2 = \text{CHCOOR}_3$ ,  
 20  $\text{R}_3$  representing a linear or branched  $\text{C}_1$  to  $\text{C}_{12}$  unsubstituted alkyl group, with the exception of the tert-butyl group, in which one or more hetero atoms chosen from O, N and S is (are) optionally intercalated,
- 25 - methacrylates of formula  $\text{CH}_2 = \text{C}(\text{CH}_3)\text{-COOR}_4$ ,  
 $\text{R}_4$  representing a linear or branched  $\text{C}_6$  to  $\text{C}_{12}$  unsubstituted alkyl group, in which one or more hetero

atoms chosen from O, N and S is (are) optionally intercalated;

- vinyl esters of formula  $R_5\text{-CO-O-CH=CH}_2$

in which  $R_5$  represents a linear or branched  $C_4$  to  $C_{12}$

5 alkyl group,

- ethers of vinyl alcohol and of a  $C_4$  to  $C_{12}$  alcohol,

- N-( $C_4$  to  $C_{12}$ )alkyl acrylamides, such as N-octylacrylamide,

- and mixtures thereof.

10                   The main monomers that are particularly preferred for the block with a  $T_g$  of less than or equal to  $20^\circ\text{C}$  are alkyl acrylates whose alkyl chain contains from 1 to 10 carbon atoms, with the exception of the tert-butyl group, such as methyl acrylate, isobutyl  
15 acrylate and 2-ethylhexyl acrylate, and mixtures thereof.

c) Block with a  $T_g$  of between  $20$  and  $40^\circ\text{C}$

The block with a  $T_g$  of between  $20$  and  $40^\circ\text{C}$  may be a homopolymer or a copolymer.

20                   In the case where this block is a homopolymer, it is derived from a monomer (or main monomer) whose homopolymer has a glass transition temperature of between  $20$  and  $40^\circ\text{C}$ .

The monomers whose homopolymer has a glass  
25 transition temperature of between  $20$  and  $40^\circ\text{C}$  are preferably chosen from n-butyl methacrylate, cyclodecyl acrylate, neopentyl acrylate and isodecylacrylamide,

and mixtures thereof.

In the case where the block with a Tg of between 20 and 40°C is a copolymer, it is totally or partially derived from one or more monomers (or main  
5 monomer) whose nature and concentration are chosen such that the Tg of the resulting copolymer is between 20 and 40°C.

Advantageously, the block with a Tg of between 20 and 40°C is a copolymer totally or partially  
10 derived from:

- main monomers whose corresponding homopolymer has a Tg of greater than or equal to 40°C, for example a Tg ranging from 40°C to 150°C, preferably greater than or equal to 50°C, for example ranging from 50 to 120°C and  
15 better still greater than or equal to 60°C, for example ranging from 60°C to 120°C, as described above, and
- main monomers whose corresponding homopolymer has a Tg of less than or equal to 20°C, for example a Tg ranging from -100 to 20°C, preferably less than or  
20 equal to 15°C, especially ranging from -80°C to 15°C and better still less than or equal to 10°C, for example ranging from -50°C to 0°C, as described above, the said monomers being chosen such that the Tg of the copolymer forming the first block is between 20 and  
25 40°C.

Such main monomers are chosen, for example, from methyl methacrylate, isobornyl acrylate and

methacrylate, butyl acrylate and 2-ethylhexyl acrylate, and mixtures thereof.

Preferably, the proportion of the second block with a Tg of less than or equal to 20°C ranges  
5 from 10% to 85%, better still from 20% to 70% and even better still from 20% to 50% by weight of the polymer.

Preferably, the polymer used in the composition according to the invention does not comprise any styrene monomers such as styrene or  
10 styrene derivatives, for instance methylstyrene, chlorostyrene or chloromethylstyrene.

However, each of the blocks may contain in small proportion at least one constituent monomer of the other block.

15 Thus, the first block may contain at least one constituent monomer of the second block, and vice versa.

Each of the first and/or second blocks may comprise, in addition to the monomers indicated above,  
20 one or more other monomers known as additional monomers, which are different from the main monomers mentioned above.

The nature and amount of this or these additional monomer(s) are chosen such that the block in  
25 which they are present has the desired glass transition temperature.

This additional monomer is chosen, for



example, from:

a) hydrophilic monomers such as:

- ethylenically unsaturated monomers comprising at least one carboxylic or sulfonic acid function, for

5 instance:

acrylic acid, methacrylic acid, crotonic acid, maleic anhydride, itaconic acid, fumaric acid, maleic acid, acrylamidopropanesulfonic acid, vinylbenzoic acid, vinylphosphoric acid, and salts thereof,

10 - ethylenically unsaturated monomers comprising at least one tertiary amine function, for instance 2-vinylpyridine, 4-vinylpyridine, dimethylaminoethyl methacrylate, diethylaminoethyl methacrylate and dimethylaminopropylmethacrylamide, and salts thereof,

15 - methacrylates of formula  $\text{CH}_2 = \text{C}(\text{CH}_3) - \text{COOR}_6$

in which  $\text{R}_6$  represents a linear or branched alkyl group containing from 1 to 4 carbon atoms, such as a methyl, ethyl, propyl or isobutyl group, the said alkyl group being substituted with one or more substituents chosen

20 from hydroxyl groups (for instance 2-hydroxypropyl methacrylate and 2-hydroxyethyl methacrylate) and halogen atoms (Cl, Br, I or F), such as trifluoroethyl methacrylate,

- methacrylates of formula  $\text{CH}_2 = \text{C}(\text{CH}_3) - \text{COOR}_9$ ,

25  $\text{R}_9$  representing a linear or branched  $\text{C}_6$  to  $\text{C}_{12}$  alkyl group in which one or more hetero atoms chosen from O, N and S is (are) optionally intercalated, the said

alkyl group being substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I or F);

- acrylates of formula  $\text{CH}_2 = \text{CHCOOR}_{10}$ ,

5  $\text{R}_{10}$  representing a linear or branched  $\text{C}_1$  to  $\text{C}_{12}$  alkyl group substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I or F), such as 2-hydroxypropyl acrylate and 2-hydroxyethyl acrylate, or  $\text{R}_{10}$  represents a  $\text{C}_1$  to  $\text{C}_{12}$  alkyl-O-POE

10 (polyoxyethylene) with repetition of the oxyethylene unit 5 to 30 times, for example methoxy-POE, or  $\text{R}_{10}$  represents a polyoxyethylenated group comprising from 5 to 30 ethylene oxide units

b) ethylenically unsaturated monomers comprising one or  
15 more silicon atoms, such as methacryloxypropyltrimethoxysilane and methacryloxypropyltris(trimethylsiloxy)silane,

- and mixtures thereof.

Additional monomers that are particularly  
20 preferred are acrylic acid, methacrylic acid and trifluoroethyl methacrylate, and mixtures thereof.

According to one preferred embodiment, the polymer used in the composition according to the invention is a non-silicone polymer, i.e. a polymer  
25 free of silicon atoms.

This or these additional monomer(s) generally represent(s) an amount of less than or equal to 30% by

weight, for example from 1% to 30% by weight, preferably from 5% to 20% by weight and more preferably from 7% to 15% by weight, relative to the total weight of the first and/or second blocks.

5                    Preferably, each of the first and second blocks comprises at least one monomer chosen from (meth)acrylic acid esters as defined above, and optionally one monomer chosen from (meth)acrylic acid, and mixtures thereof.

10                   Advantageously, each of the first and second blocks is totally derived from at least one monomer chosen from (meth)acrylic acid esters as defined above, and optionally one monomer chosen from (meth)acrylic acid, and mixtures thereof.

15                   The polymer used in the composition according to the invention may be obtained by free-radical solution polymerization according to the following preparation process:

- a portion of the polymerization solvent is
- 20 introduced into a suitable reactor and heated until the adequate temperature for the polymerization is reached (typically between 60 and 120°C),
- once this temperature is reached, the constituent monomers of the first block are introduced in the
- 25 presence of a portion of the polymerization initiator,
- after a time T corresponding to a maximum degree of conversion of 90%, the constituent monomers of the

second block and the rest of the initiator are introduced,

- the mixture is left to react for a time T' (ranging from 3 to 6 hours), after which the mixture is
- 5 cooled to room temperature,
- the polymer dissolved in the polymerization solvent is obtained.

The term "polymerization solvent" means a solvent or a mixture of solvents. The polymerization

10 solvent may be chosen especially from ethyl acetate, butyl acetate, alcohols such as isopropanol or ethanol, and aliphatic alkanes such as isododecane, and mixtures thereof. Preferably, the polymerization solvent is a mixture of butyl acetate and isopropanol or

15 isododecane.

According to a first embodiment, the block polymer used in the composition according to the invention comprises at least one (especially one) first block with a Tg of greater than or equal to 40°C, as

20 described above in a) and at least one (especially one) second block with a Tg of less than or equal to 20°C, as described above in b).

Preferably, the first block with a Tg of greater than or equal to 40°C is a copolymer derived

25 from monomers whose homopolymer has a glass transition temperature of greater than or equal to 40°C, such as the monomers described above.

Advantageously, the second block with a Tg of less than or equal to 20°C is a homopolymer, especially derived from monomers as described above.

Preferably, the proportion of the block with  
5 a Tg of greater than or equal to 40°C ranges from 20% to 90%, better still from 30% to 80% and even better still from 50% to 70% by weight of the polymer.

Preferably, the proportion of the block with a Tg of less than or equal to 20°C ranges from 5% to  
10 75%, preferably from 15% to 50% and better still from 25% to 45% by weight of the polymer.

Thus, according to a first variant, the block polymer used in the composition according to the invention may comprise:

- 15 - a first block with a Tg of greater than or equal to 40°C, for example having a Tg ranging from 70 to 110°C, which is a methyl methacrylate/acrylic acid copolymer,
- a second block with a Tg of less than or equal to 20°C, for example ranging from 0 to 20°C, which is a  
20 methyl acrylate homopolymer, and
- an intermediate block that is a methyl methacrylate/acrylic acid/methyl acrylate copolymer.

According to a second variant, the block polymer used in the composition according to the  
25 invention may comprise:

- a first block with a Tg of greater than or equal to 40°C, for example ranging from 70 to 100°C, which is a

methyl methacrylate/acrylic acid/trifluoroethyl  
methacrylate copolymer,

- a second block with a Tg of less than or equal to 20°C, for example ranging from 0 to 20°C, which is a
- 5 methyl acrylate homopolymer, and
- an intermediate block that is a methyl methacrylate/acrylic acid/methyl acrylate/trifluoroethyl methacrylate random copolymer.

- According to a third variant, the block
- 10 polymer used in the composition according to the invention may comprise:
- a first block with a Tg of greater than or equal to 40°C, for example ranging from 85 to 115°C, which is an isobornyl acrylate/isobutyl methacrylate copolymer,
  - 15 - a second block with a Tg of less than or equal to 20°C, for example ranging from -85 to -55°C, which is a 2-ethylhexyl acrylate homopolymer, and
  - an intermediate block, which is an isobornyl acrylate/isobutyl methacrylate/2-ethylhexyl acrylate
  - 20 random copolymer.

- According to a fourth variant, the block polymer used in the composition according to the invention may comprise:
- a first block with a Tg of greater than or equal to
  - 25 40°C, for example ranging from 85 to 115°C, which is an isobornyl acrylate/methyl methacrylate copolymer,
  - a second block with a Tg of less than or equal to

20°C, for example ranging from -85 to -55°C, which is a 2-ethylhexyl acrylate homopolymer, and

- an intermediate block that is an isobornyl acrylate/methyl methacrylate/2-ethylhexyl acrylate

5 random copolymer.

According to a fifth variant, the block polymer used in the composition according to the invention may comprise:

- a first block with a Tg of greater than or equal to
- 10 40°C, for example ranging from 95 to 125°C, which is an isobornyl acrylate/isobornyl methacrylate copolymer,
  - a second block with a Tg of less than or equal to

20°C, for example ranging from -85 to -55°C, which is a 2-ethylhexyl acrylate homopolymer, and

  - 15 - an intermediate block that is an isobornyl acrylate/isobornyl methacrylate/2-ethylhexyl acrylate random copolymer.

According to a sixth variant, the block polymer used in the composition according to the

20 invention may comprise:

- a first block with a Tg of greater than or equal to
- 40°C, for example ranging from 85 to 115°C, which is an isobornyl methacrylate/isobutyl methacrylate copolymer,
  - a second block with a Tg of less than or equal to

25 20°C, for example ranging from -35 to -5°C, which is an isobutyl acrylate homopolymer, and
  - an intermediate block that is an isobornyl

methacrylate/isobutyl methacrylate/isobutyl acrylate random copolymer.

According to a seventh variant, the block polymer used in the composition according to the

5 invention may comprise:

- a first block with a Tg of greater than or equal to 40°C, for example ranging from 95 to 125°C, which is an isobornyl acrylate/isobornyl methacrylate copolymer,
- a second block with a Tg of less than or equal to 10 20°C, for example ranging from -35 to -5°C, which is an isobutyl acrylate homopolymer, and
- an intermediate block that is an isobornyl methacrylate/isobornyl methacrylate/isobutyl acrylate random copolymer.

15 According to an eighth variant, the block polymer used in the composition according to the invention may comprise:

- a first block with a Tg of greater than or equal to 40°C, for example ranging from 60 to 90°C, which is an
- 20 isobornyl acrylate/isobutyl methacrylate copolymer,
- a second block with a Tg of less than or equal to 20°C, for example ranging from -35 to -5°C, which is an isobutyl acrylate homopolymer, and
- an intermediate block that is an isobornyl
- 25 acrylate/isobutyl methacrylate/isobutyl acrylate random copolymer.

According to a second embodiment, the polymer



used in the composition according to the invention comprises at least one (especially one) first block with a glass transition temperature ( $T_g$ ) of between 20 and 40°C, in accordance with the blocks described in c) and at least one (especially one) second block with a glass transition temperature of less than or equal to 20°C, as described above in b) or a glass transition temperature of greater than or equal to 40°C, as described in a) above.

10                Preferably, the proportion of the first block with a  $T_g$  of between 20 and 40°C ranges from 10% to 85%, better still from 30% to 80% and even better still from 50% to 70% by weight of the polymer.

                 When the second block is a block with a  $T_g$  of  
15 greater than or equal to 40°C, it is preferably present in a proportion ranging from 10% to 85%, better still from 20% to 70% and even better still from 30% to 70% by weight of the polymer.

                 When the second block is a block with a  $T_g$  of  
20 less than or equal to 20°C, it is preferably present in a proportion ranging from 10% to 85%, better still from 20% to 70% and even better still from 20% to 50% by weight of the polymer.

                 Preferably, the first block with a  $T_g$  of  
25 between 20 and 40°C is a copolymer derived from monomers which are such that the corresponding homopolymer has a  $T_g$  of greater than or equal to 40°C,

and from monomers which are such that the corresponding homopolymer has a Tg of less than or equal to 20°C.

Advantageously, the second block with a Tg of less than or equal to 20°C or with a Tg of greater than 5 or equal to 40°C is a homopolymer.

Thus, according to a first variant of this second embodiment, the polymer used in the composition according to the invention may comprise:

- a first block with a Tg of between 20 and 40°C, for 10 example with a Tg of 25 to 39°C, which is a copolymer comprising at least one methyl acrylate monomer, at least one methyl methacrylate monomer and at least one acrylic acid monomer,
- a second block with a Tg of greater than or equal to 15 40°C, for example ranging from 85 to 125°C, which is a homopolymer composed of methyl methacrylate monomers, and
- an intermediate block comprising at least one methyl acrylate or methyl methacrylate monomer, and
- 20 - an intermediate block comprising methyl methacrylate, at least one acrylic acid monomer and at least one methyl acrylate monomer.

According to a second variant of this second embodiment, the polymer used in the composition 25 according to the invention may comprise:

- a first block with a Tg of between 20 and 40°C, for example with a Tg of 21 to 39°C, which is a copolymer

comprising isobornyl acrylate/isobutyl

methacrylate/2-ethylhexyl acrylate,

- a second block with a Tg of less than or equal to 20°C, for example ranging from -65 to -35°C, which is a

5 methyl methacrylate homopolymer, and

- an intermediate block that is an isobornyl acrylate/isobutyl methacrylate/2-ethylhexyl acrylate random copolymer.

According to a third variant of this second  
10 embodiment, the polymer used in the composition according to the invention may comprise:

- a first block with a Tg of between 20 and 40°C, for example with a Tg from 21 to 39°C, which is an isobornyl acrylate/methyl acrylate/acrylic acid

15 copolymer,

- a second block with a Tg of greater than or equal to 40°C, for example ranging from 85 to 115°C, which is an isobornyl acrylate homopolymer, and

- an intermediate block that is an isobornyl  
20 acrylate/methyl acrylate/acrylic acid random copolymer.

The block polymer may be present in the composition according to the invention in a content ranging from 0.1% to 60% by weight, preferably ranging from 0.5% to 50% by weight and more preferably ranging  
25 from 1% to 40% by weight, relative to the total weight of the composition.

According to one particularly preferred

embodiment, the organic liquid medium of the composition contains at least one organic liquid that is the or one of the organic solvent(s) for polymerization of the block polymer as described above.

- 5 Advantageously, the said organic polymerization solvent is the organic liquid that is present in majority amount by weight in the organic liquid medium of the cosmetic composition.

The cosmetic composition according to the  
10 invention comprises a cosmetically acceptable medium, i.e. a medium that is compatible with keratin materials, for instance the skin, the lips, the hair, the eyelashes, the eyebrows and the nails.

The composition according to the invention  
15 may comprise at least one volatile oil.

The term "oil" means any non-aqueous medium that is liquid at room temperature (25°C) and atmospheric pressure (760 mmHg), which is compatible with application to the skin, mucous membranes (lips)  
20 and/or the integuments (nails, eyelashes, eyebrows or hair).

The term "volatile oil" means any non-aqueous medium capable of evaporating from the skin or the lips in less than one hour, especially having a vapour  
25 pressure, at room temperature and atmospheric pressure, ranging from  $10^{-3}$  to 300 mmHg (0.13 Pa to 40 000 Pa).

According to the invention, one or more

volatile oils may be used.

These oils may be hydrocarbon-based oils or silicone oils optionally comprising alkyl or alkoxy groups that are pendent or at the end of a silicone  
5 chain.

The term "hydrocarbon-based oil" means an oil essentially formed from, or even consisting of, carbon and hydrogen atoms, and possibly oxygen or nitrogen atoms, and containing no silicon or fluorine atoms. It  
10 may contain alcohol, ester, ether, carboxylic acid, amine and/or amide groups.

As volatile silicone oils that may be used in the invention, mention may be made of linear or cyclic silicones containing from 2 to 7 silicon atoms, these  
15 silicones optionally comprising alkyl or alkoxy groups containing from 1 to 10 carbon atoms. As volatile silicone oils that may be used in the invention, mention may be made especially of octamethylcyclotetra-  
siloxane, decamethylcyclopentasiloxane, dodecamethyl-  
20 cyclohexasiloxane, heptamethylhexyltrisiloxane, heptamethyloctyltrisiloxane, octamethyltrisiloxane and decamethyltetrasiloxane, and mixtures thereof.

As other volatile oils that may be used in the invention,  $C_8$ - $C_{16}$ , for instance isododecane,  
25 isodecane and isohexadecane and, for example, the oils sold under the trade names Isopar and Permethyl, and especially isododecane (Permethyl 99 A), are especially

preferred.

The volatile oil may be present in the composition according to the invention in a content ranging from 1% to 70% by weight, preferably ranging  
5 from 5% to 50% by weight and preferentially ranging from 10% to 35% by weight, relative to the total weight of the composition.

The composition according to the invention may comprise a non-volatile oil.

10 The term "non-volatile oil" means an oil that is capable of remaining on the skin at room temperature (25°C) and atmospheric pressure for at least one hour and especially having a non-zero vapour pressure, at room temperature (25°C) and atmospheric pressure, of  
15 less than 0.01 mmHg (1.33 Pa).

The non-volatile oil may be chosen from hydrocarbon-based and silicone non-volatile oils.

The non-volatile oil may be chosen from polar or apolar non-volatile oils and polar non-volatile  
20 oils, and mixtures thereof.

The non-volatile oil may be present in the composition according to the invention in a content ranging from 1% to 80% by weight, preferably ranging from 5% to 60% by weight, and preferentially ranging  
25 from 10% to 50% by weight, especially ranging from 20% to 50% by weight, relative to the total weight of the composition.

As non-volatile oil that may be used in the invention, mention may be made of:

- non-volatile hydrocarbon-based oils such as liquid paraffin (or petroleum jelly), squalane, hydrogenated  
5 polyisobutylene (parleam oil), perhydrosqualene, mink oil, turtle oil, soybean oil, sweet almond oil, beauty-leaf oil, palm oil, grapeseed oil, sesame seed oil, maize oil, arara oil, rapeseed oil, sunflower oil, cotton seed oil, apricot oil, castor oil, avocado oil,  
10 jojoba oil, olive oil or cereal germ oil; lanolic acid, oleic acid, lauric acid or stearic acid esters; fatty esters, especially of  $C_{12}$ - $C_{36}$ , such as isopropyl myristate, isopropyl palmitate, butyl stearate, hexyl laurate, diisopropyl adipate, isononyl isononanoate, 2-  
15 ethylhexyl palmitate, 2-hexyldecyl laurate, 2-octyldecyl palmitate, 2-octyldodecyl myristate or lactate, bis(2-ethylhexyl) succinate, diisostearyl malate, and glyceryl or diglyceryl triisostearate; higher fatty acids, especially of  $C_{14}$ - $C_{22}$ , such as myristic acid,  
20 palmitic acid, stearic acid, behenic acid, oleic acid, linoleic acid, linolenic acid or isostearic acid; higher fatty alcohols, especially of  $C_{16}$ - $C_{22}$ , such as cetanol, oleyl alcohol, linoleyl alcohol, linolenyl alcohol, isostearyl alcohol or octyldodecanol; and  
25 mixtures thereof;
- non-volatile silicone oils such as non-volatile polydimethylsiloxanes (PDMSs); polydimethylsiloxanes

comprising alkyl, alkoxy or phenyl groups, pendent or at the end of a silicone chain, these groups containing from 2 to 24 carbon atoms; phenyl silicones, for instance phenyl trimethicones, phenyl dimethicones, 5 phenyltrimethylsiloxydiphenylsiloxanes, diphenyl dimethicones and diphenylmethyl diphenyltrisiloxanes; polysiloxanes modified with fatty acids (especially of  $C_8-C_{20}$ ), fatty alcohols (especially of  $C_8-C_{20}$ ) or polyoxyalkylenes (especially polyoxyethylene and/or 10 polyoxypropylene); amino silicones; silicones containing hydroxyl groups; fluoro silicones comprising a fluoro group that is pendent or at the end of a silicone chain, containing from 1 to 12 carbon atoms, some or all of the hydrogens of which are replaced with 15 fluorine atoms; and mixtures thereof.

The composition according to the invention may also comprise at least some fatty substances that are solid at room temperature, chosen especially from waxes, pasty fatty substances and gums, and mixtures 20 thereof. These fatty substances may be of animal, plant, mineral or synthetic origin.

For the purposes of the present invention, the term "wax" means a lipophilic compound that is solid at room temperature ( $25^{\circ}C$ ), which undergoes a 25 reversible solid/liquid change of state, and which has a melting point of greater than or equal to  $30^{\circ}C$ , which may be up to  $120^{\circ}C$ .



The melting point of the wax may be measured using a differential scanning calorimeter (DSC), for example the calorimeter sold under the name DSC 30 by the company Mettler.

5           The waxes may be hydrocarbon-based waxes, fluoro waxes and/or silicone waxes and may be of plant, mineral, animal and/or synthetic origin. In particular, the waxes have a melting point of greater than 25°C and better still greater than 45°C.

10           As waxes that may be used in the composition of the invention, mention may be made of beeswax, carnauba wax or candelilla wax, paraffin, microcrystalline waxes, ceresin or ozokerite, synthetic waxes, for instance polyethylene waxes or Fischer-Tropsch waxes,  
15 and silicone waxes, for instance alkyl or alkoxy dimethicones containing from 16 to 45 carbon atoms.

          The gums are generally polydimethylsiloxanes (PDMSs) of high molecular weight or cellulose gums or polysaccharides, and the pasty substances are generally  
20 hydrocarbon-based compounds, for instance lanolins and derivatives thereof, or PDMSs.

          The nature and amount of the solid substances depend on the desired mechanical properties and textures. As a guide, the composition may contain from  
25 0.1% to 50% by weight and better still from 1% to 30% by weight of waxes, relative to the total weight of the composition.

The composition may thus comprise water or a mixture of water and hydrophilic organic solvent(s), for instance alcohols and especially linear or branched lower monoalcohols containing from 2 to 5 carbon atoms, 5 for instance ethanol, isopropanol or n-propanol, and polyols, for instance glycerol, diglycerol, propylene glycol, sorbitol or pentyleneglycol, and polyethylene glycols, or hydrophilic C<sub>2</sub> ethers and C<sub>2</sub>-C<sub>4</sub> aldehydes.

The water or the mixture of water and 10 hydrophilic organic solvents may be present in the composition according to the invention in a content ranging from 0.1% to 99% by weight and preferably from 10% to 80% by weight, relative to the total weight of the composition.

15 The composition may comprise, besides the block polymer described above according to the invention, an additional polymer such as a film-forming polymer. According to the present invention, the term "film-forming polymer" means a polymer that is capable 20 of forming, by itself or in the presence of an auxiliary film-forming agent, a continuous film that adheres to a support, especially to keratin materials.

Among the film-forming polymers that may be used in the composition of the present invention, 25 mention may be made of synthetic polymers, of free-radical type or of polycondensate type, polymers of natural origin, and mixtures thereof. Film-forming

polymers that may be mentioned in particular include acrylic polymers, polyurethanes, polyesters, polyamides, polyureas and cellulose-based polymers, for instance nitrocellulose.

5           The composition according to the invention may also comprise one or more dyestuffs chosen from water-soluble dyes and pulverulent dyestuffs, for instance pigments, nacles and flakes that are well known to those skilled in the art. The dyestuffs may be  
10 present in the composition in a content ranging from 0.01% to 50% by weight and preferably from 0.01% to 30% by weight, relative to the weight of the composition.

          The term "pigments" should be understood as meaning white or coloured, mineral or organic particles  
15 of any shape, which are insoluble in the physiological medium and which are intended to colour the composition.

          The term "nacles" should be understood as meaning iridescent particles of any shape, produced  
20 especially by certain molluscs in their shell, or alternatively synthesized.

          The pigments may be white or coloured, and mineral and/or organic. Among the mineral pigments that may be mentioned are titanium dioxide, optionally  
25 surface-treated, zirconium oxide or cerium oxide, and also zinc oxide, iron oxide (black, yellow or red) or chromium oxide, manganese violet, ultramarine blue,

chromium hydrate and ferric blue, and metal powders, for instance aluminium powder or copper powder.

Among the organic pigments that may be mentioned are carbon black, pigments of D & C type, and  
5 lakes based on cochineal carmine or on barium, strontium, calcium or aluminium.

Mention may also be made of pigments with an effect, such as particles comprising a natural or synthetic, organic or mineral substrate, for example  
10 glass, acrylic resins, polyester, polyurethane, polyethylene terephthalate, ceramics or aluminas, the said substrate being uncoated or coated with metal substances, for instance aluminium, gold, silver, platinum, copper or bronze, or with metal oxides, for  
15 instance titanium dioxide, iron oxide or chromium oxide, and mixtures thereof.

The nacreous pigments may be chosen from white nacreous pigments such as mica coated with titanium or with bismuth oxychloride, coloured nacreous  
20 pigments such as titanium mica coated with iron oxides, titanium mica coated especially with ferric blue or chromium oxide, titanium mica coated with an organic pigment of the abovementioned type and also nacreous pigments based on bismuth oxychloride. Interference  
25 pigments, especially liquid-crystal pigments or multilayer pigments, may also be used.

The water-soluble dyes are, for example,

beetroot juice or methylene blue.

The composition according to the invention may comprise at least one filler, especially in a content ranging from 0.01% to 50% by weight and  
5 preferably ranging from 0.01% to 30% by weight, relative to the total weight of the composition. The term "fillers" should be understood as meaning colourless or white, mineral or synthetic particles of any shape, which are insoluble in the medium of the  
10 composition, irrespective of the temperature at which the composition is manufactured. These fillers serve especially to modify the rheology or the texture of the composition.

The fillers may be mineral or organic in any  
15 form, platelet-shaped, spherical or oblong, irrespective of the crystallographic form (for example leaflet, cubic, hexagonal, orthorhombic, etc.). Mention may be made of talc, mica, silica, kaolin, polyamide (Nylon®) powders (Orgasol® from Atochem), poly- $\beta$ -  
20 alanine powder and polyethylene powder, powders of tetrafluoroethylene polymers (Teflon®), lauroyllysine, starch, boron nitride, hollow polymer microspheres such as those of polyvinylidene chloride/acrylonitrile, for instance Exapancel® (Nobel Industrie) or acrylic acid  
25 copolymers (Polytrap® from the company Dow Corning) and silicone resin microbeads (for example Tospearls® from Toshiba), elastomeric polyorganosiloxane particles,

precipitated calcium carbonate, magnesium carbonate, magnesium hydrocarbonate, hydroxyapatite, hollow silica microspheres (Silica Beads® from Maprecos), glass or ceramic microcapsules, and metal soaps derived from  
5 organic carboxylic acids containing from 8 to 22 carbon atoms and preferably from 12 to 18 carbon atoms, for example zinc, magnesium or lithium stearate, zinc laurate or magnesium myristate.

The composition according to the invention  
10 may also contain ingredients commonly used in cosmetics, such as vitamins, thickeners, trace elements, softeners, sequestering agents, fragrances, acidifying or basifying agents, preserving agents, sunscreens, surfactants, antioxidants, agents for  
15 preventing hair loss, antidandruff agents and propellants, or mixtures thereof.

Needless to say, a person skilled in the art will take care to select this or these optional additional compound(s), and/or the amount thereof, such  
20 that the advantageous properties of the corresponding composition according to the invention are not, or are not substantially, adversely affected by the envisaged addition.

The composition according to the invention  
25 may especially be in the form of a suspension, a dispersion, a solution, a gel, an emulsion, especially an oil-in-water (O/W) emulsion, a water-in-oil (W/O)

emulsion or a multiple emulsion (W/O/W or polyol/O/W or O/W/O emulsion), in the form of a cream, a paste, a mousse, a dispersion of vesicles, especially of ionic or nonionic lipids, a two-phase or multi-phase lotion, 5 a spray, a powder, a paste, especially a soft paste (especially a paste with a dynamic viscosity at 25°C of about from 0.1 to 40 Pa.s under a shear rate of 200 s<sup>-1</sup>, after measurement for 10 minutes in cone/plate geometry). The composition may be anhydrous; for 10 example, it may be an anhydrous stick or paste. The composition may be a leave-in composition.

A person skilled in the art may select the appropriate galenical form, and also the method for preparing it, on the basis of his general knowledge, 15 taking into account firstly the nature of the constituents used, especially their solubility in the support, and secondly the intended application for the composition.

According to another aspect, the invention 20 also relates to a cosmetic assembly comprising: .

- i) a container delimiting at least one compartment, the said container being closed by a closing member; and
- ii) a composition placed inside the said 25 compartment, the composition being in accordance with any one of the preceding claims.

The container may be in any adequate form. It may especially be in the form of a bottle, a tube, a jar, a case, a box, a sachet or a carton.

The closing member may be in the form of a  
5 removable stopper, a lid, a cap, a tear-off strip or a capsule, especially of the type comprising a body attached to the container and a cover cap articulated on the body. It may also be in the form of a member for selectively closing the container, especially a pump, a  
10 valve or a flap valve.

The container may be combined with an applicator, especially in the form of a brush comprising an arrangement of bristles maintained by a twisted wire. Such a twisted brush is described  
15 especially in patent US 4 887 622. It may also be in the form of a comb comprising a plurality of application members, obtained especially by moulding. Such combs are described, for example, in patent FR 2 796 529. The applicator may be in the form of a  
20 fine brush, as described, for example, in patent FR 2 722 380. The applicator may be in the form of a block of foam or of elastomer, a felt or a spatula. The applicator may be free (tuft or sponge) or securely fastened to a rod borne by the closing member, as  
25 described, for example, in patent US 5 492 426. The applicator may be securely fastened to the container, as described, for example, in patent FR 2 761 959.



The product may be contained directly in the container, or indirectly. By way of example, the product may be arranged on an impregnated support, especially in the form of a wipe or a pad, and arranged  
5 (individually or in plurality) in a box or in a sachet. Such a support incorporating the product is described, for example, in patent application WO 01/03538.

The closing member may be coupled to the container by screwing. Alternatively, the coupling  
10 between the closing member and the container is done other than by screwing, especially via a bayonet mechanism, by click-fastening, gripping, welding, bonding or by magnetic attraction. The term "click-fastening" in particular means any system involving the  
15 crossing of a bead or cord of material by elastic deformation of a portion, especially of the closing member, followed by return to the elastically unconstrained position of the said portion after the crossing of the bead or cord.

20 The container may be at least partially made of thermoplastic material. Examples of thermoplastic materials that may be mentioned include polypropylene or polyethylene.

Alternatively, the container is made of non-  
25 thermoplastic material, especially glass or metal (or alloy).

The container may have rigid walls or

deformable walls, especially in the form of a tube or a tubular bottle.

The container may comprise means for distributing or facilitating the distribution of the composition. By way of example, the container may have deformable walls so as to allow the composition to exit in response to a positive pressure inside the container, this positive pressure being caused by elastic (or non-elastic) squeezing of the walls of the container. Alternatively, especially when the product is in the form of a stick, the product may be driven out by a piston mechanism. Still in the case of a stick, especially of makeup product (lipstick, foundation, etc.), the container may comprise a mechanism, especially a rack mechanism, a threaded-rod mechanism or a helical groove mechanism, and may be capable of moving a stick in the direction of the said aperture. Such a mechanism is described, for example, in patent FR 2 806 273 or in patent FR 2 775 566. Such a mechanism for a liquid product is described in patent FR 2 727 609.

The container may consist of a carton with a base delimiting at least one housing containing the composition, and a lid, especially articulated on the base, and capable of at least partially covering the said base. Such a carton is described, for example, in patent application WO 03/018423 or in patent

FR 2 791 042.

The container may be equipped with a drainer arranged in the region of the aperture of the container. Such a drainer makes it possible to wipe the applicator and possibly the rod to which it may be securely fastened. Such a drainer is described, for example, in patent FR 2 792 618.

The composition may be at atmospheric pressure inside the container (at room temperature) or pressurized, especially by means of a propellant gas (aerosol). In the latter case, the container is equipped with a valve (of the type used for aerosols).

The content of the patents or patent applications mentioned above are incorporated by reference into the present patent application.

The invention is illustrated in greater detail by the examples described below.

**Example 1:**

**Preparation of a poly(isobornyl acrylate/isobutyl methacrylate/2-ethylhexyl acrylate) polymer**

100 g of isododecane are introduced into a 1 litre reactor and the temperature is then increased so as to pass from room temperature (25°C) to 90°C over 1 hour.

120 g of isobornyl acrylate, 90 g of isobutyl methacrylate, 110 g of isododecane and 1.8 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane

(Trigonox<sup>®</sup> 141 from Akzo Nobel) are then added, at 90°C and over 1 hour.

The mixture is maintained at 90°C for 1 hour 30 minutes.

5                    90 g of 2-ethylhexyl acrylate, 90 g of isododecane and 1.2 g of 2,5-bis(2-ethylhexanoyl-peroxy)-2,5-dimethylhexane are then introduced into the above mixture, still at 90°C and over 30 minutes.

The mixture is maintained at 90°C for 3 hours  
10 and is then cooled.

A solution containing 50% polymer active material in isododecane is obtained.

A polymer comprising a poly(isobornyl acrylate/isobutyl methacrylate) first block with a Tg  
15 of 80°C, a poly-2-ethylhexyl acrylate second block with a Tg of -70°C and an intermediate block that is an isobornyl acrylate/isobutyl methacrylate/2-ethylhexyl acrylate random polymer is obtained.

This polymer has a weight-average mass of  
20 77 000 and a number-average mass of 19 000, i.e. a polydispersity index I of 4.05.

#### **Example 2:**

#### **Preparation of a poly(isobornyl acrylate/isobornyl methacrylate/2-ethylhexyl acrylate) polymer**

25                    100 g of isododecane are introduced into a 1 litre reactor and the temperature is then increased so as to pass from room temperature (25°C) to 90°C over

1 hour.

105 g of isobornyl acrylate, 105 g of isobornyl methacrylate, 110 g of isododecane and 1.8 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane (Trigonox<sup>®</sup> 141 from Akzo Nobel) are then added, at 90°C and over 1 hour.

The mixture is maintained at 90°C for 1 hour 30 minutes.

90 g of 2-ethylhexyl acrylate, 90 g of isododecane and 1.2 g of 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane are then introduced into the above mixture, still at 90°C and over 30 minutes.

The mixture is maintained at 90°C for 3 hours and is then cooled.

15 A solution containing 50% polymer active material in isododecane is obtained.

A polymer comprising a poly(isobornyl acrylate/isobornyl methacrylate) first block with a T<sub>g</sub> of 110°C, a poly-2-ethylhexyl acrylate second block with a T<sub>g</sub> of -70°C and an intermediate block that is an isobornyl acrylate/isobornyl methacrylate/2-ethylhexyl acrylate random polymer is obtained.

This polymer has a weight-average mass of 103 900 and a number-average mass of 21 300, i.e. a polydispersity index I of 4.89.

**Example 3:****Preparation of a poly(isobornyl acrylate/isobutyl methacrylate/isobutyl acrylate) polymer**

100 g of isododecane are introduced into a  
5 1 litre reactor and the temperature is then increased  
so as to pass from room temperature (25°C) to 90°C over  
1 hour.

120 g of isobornyl acrylate, 90 g of isobutyl  
methacrylate, 110 g of isododecane and 1.8 g of  
10 2,5-bis(2-ethylhexanoylperoxy)-2,5-dimethylhexane  
(Trigonox® 141 from Akzo Nobel) are then added, at 90°C  
and over 1 hour.

The mixture is maintained at 90°C for 1 hour  
30 minutes.

15 90 g of isobutyl acrylate, 90 g of  
isododecane and 1.2 g of 2,5-bis(2-ethylhexanoyl-  
peroxy)-2,5-dimethylhexane are then introduced into the  
above mixture, still at 90°C and over 30 minutes.

The mixture is maintained at 90°C for 3 hours  
20 and is then cooled.

A solution containing 50% polymer active  
material in isododecane is obtained.

A polymer comprising a poly(isobornyl  
acrylate/isobutyl methacrylate) first block with a Tg  
25 of 75°C, a polyisobutyl acrylate second block with a Tg  
of -20°C and an intermediate block that is an isobornyl  
acrylate/isobutyl methacrylate/isobutyl acrylate random

polymer is obtained.

This polymer has a weight-average mass of 144 200 and a number-average mass of 49 300, i.e. a polydispersity index I of 2.93.

5 **Example 4:**

A liquid lipstick having the composition below was prepared:

Block polymer of Example 2 at 50% by weight in isododecane	50 g
Hydrophobic-treated fumed silica (Aerosil R 972 from Degussa)	5 g
Hydrogenated polyisobutylene (parleam oil)	2.1 g
Octyldodecanol	0.9 g
Phenyl silicone oil (Dow Corning 556 C)	2.1 g
Polyvinylpyrrolidone/eicosene copolymer (Antaron V220 from ISP)	1.2 g
Pigments	3 g
Isododecane	qs 100 g

10           The octyldodecanol, the silicone oil, the parleam oil and the polyvinylpyrrolidone/eicosene copolymer are mixed together with heating at about 60°C. A ground pigmentary mixture of the pigments is made with this mixture by grinding the mixture three  
15 times in a three-roll mill.

The ground pigmentary mixture, the

isododecane and the block polymer are then mixed together at room temperature and the silica is then finally introduced. The formulation is then introduced into a leaktight heating bottle.

5           The transfer resistance of the lipstick obtained is then measured according to the measuring protocol described above.

The lipstick forms a film that has a transfer of 0%.

10   Example 5:

A liquid lipstick having a composition similar to that of Example 4, in which the polymer of Example 2 has been replaced with the polymer of Example 1 in the same amount, was prepared.

15           The lipstick obtained forms a film that has a transfer of 0%, measured according to the protocol described above.

Example 6:

20           A liquid lipstick having the composition below was prepared:

Block polymer of Example 3 at 50% by weight in isododecane	90.7 g
Hydrophobic-treated fumed silica (Aerosil R 972 from Degussa)	5 g
Hydrogenated polyisobutylene (parleam oil)	2.1 g
Octyldodecanol	0.9 g



Phenyl silicone oil (Dow Corning 556 C)	2.1 g
Polyvinylpyrrolidone/eicosene copolymer (Antaron V220 from ISP)	1.2 g
Pigments	3 g

The lipstick obtained forms a film that has a transfer of 4%, measured according to the protocol described above.